4.7 Identity and Inverse Matrices

Identity Matrix--square matrix that when multiplied by another matrix, it equals that same matrix.

$A \cdot I = A \qquad I \cdot A = A$

$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Inverse matrices--are 2 square matrices whose product is the identity

A^{-1} -- "A inverse"

$A \cdot A^{-1} = I$
$A^{-1} \cdot A = I$

use to check if 2 matrices are inverses

Are they inverses? yes

$X = \begin{bmatrix} 3 & -2 \\ -1 & 1 \end{bmatrix} \quad Y = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$

$X \cdot Y \stackrel{?}{=} I \qquad YX \stackrel{?}{=} I$

$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \qquad = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Are they inverses? No

$\begin{bmatrix} 3 & -1 \\ 4 & -2 \end{bmatrix} \qquad \begin{bmatrix} 1 & -3 \\ 2 & 4 \end{bmatrix}$

Finding the inverse.

If D = 0, there is no inverse.

$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \qquad A^{-1} = \frac{1}{D}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

Determinant

$X = \begin{bmatrix} 3 & -2 \\ -1 & 1 \end{bmatrix} \quad D = 1 \quad 3 \quad 2$

$X^{-1} = \frac{1}{1}\begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$

HW
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